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Fruland et al.

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(54) **TISSUE-REMOVING CATHETER WITH
BALL AND SOCKET DEPLOYMENT
MECHANISM**

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See application file for complete search history.

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(58) **Field of Classification Search**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,290,427 A	9/1981	Chin
4,631,052 A	12/1986	Kensey
4,765,332 A	8/1988	Fischell et al.
4,790,813 A	12/1988	Kensey
4,926,858 A	5/1990	Gifford, III et al.
4,950,277 A	8/1990	Farr
5,026,383 A	6/1991	Nobles

(Continued)

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(57) **ABSTRACT**

A deployment mechanism of a tissue-removing catheter includes a socket member received in a catheter body that is capable of moving longitudinally therein, and a ball member extending distally from the distal end portion of the cutting element and operatively connected to the socket member. The ball member is constrained axially relative to the socket member and is capable of pivoting relative to the socket member for allowing pivoting of the cutting element relative to the socket when the cutting element is moved from a retracted position to a cutting position.

19 Claims, 25 Drawing Sheets

